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ENUMERATION OF THE NORTH AMERICAN CERCOSPORÆ.

WITH DESCRIPTIONS OF THE SPECIES.

BY J. B. ELLIS AND BENJAMIN M. EVERHART.

33. *CERCOSPORA SMILACIS*, Thuem. Hedwigia, 1880, p. 35. 33d Rep. N. Y. State Mus., p. 29 (with figures.) N. A. F. 1251. Rav. Fungi Amer. 166, 616.

Spots numerous, small, orbicular, reddish-brown, surrounded by a darker, raised margin. Hyphæ hypophyllous, tufted, slender, septate, nodulose above, colored. Conidia narrow-clavate, 30—60 μ long, hyaline, 2—4 septate.

On living leaves of various species of *Smilax* from N. Y. (Pk.) to Florida (Dr. Martin.) Distributed in F. Am. cited above, as *Helminthosporium Petersii*, B. & C., but the specimens do not agree well with the description in Grev. III, p. 102, nor with specimens of that species in Herb. Curtis.

34. *CERCOSPORA RHUINA*, C. & E. Grev. VI, p. 89. N. A. F. 47.

Mostly hypophyllous. Hyphæ olive brown, 40—60 \times 3 μ ; nucleate but mostly without septa, collected in little tufts or fascicles on reddish brown (2—4 mm.) spots with a narrow, raised margin. Conidia cylindrical at first, finally attenuated above, nearly hyaline, nucleate, sparingly and faintly septate, 40—70 \times 3 μ .

On leaves of *Rhus copallina* and *R. glabra*, from New Jersey to Kansas. Common.

Cercospora copallina, Cke., Grev. XII, p. 31, Rav. Fungi Amer. 586, is said to be "quite different," but it is not stated in what the difference consists. As far as we can see, the specimens in F. Am. 586 does not differ in any way from the N. A. F. specimens. There are the same olive brown tufted hyphæ in both. The spots and conidia also appear to be the same.

35. *CERCOSPORA DEPAZEOIDES* (Desm.) Sacc. Fungi Ven. nov. vel. crit. V, p. 187. *Exosporium depazeoides*, Desm. *Passalora penicillata*, Ces. *Cercospora sambucina*, E. & K., Am. Nat., Nov. '83, p. 1166.

On small suborbicular, reddish-brown spots (2—3 mm.) with a narrow, raised border. Hyphæ densely cæspitose, epiphyllous, brown, flexuous, 100—150 x 3—4 μ , mostly continuous. Conidia cylindric-clavate, curved, 3—7 septate, 55—75 x 3—4 μ .

On leaves of *Sambucus Canadensis*, Kansas (Kellerman), New York (Peck.)

36. *CERCOSPORA MORICOLA*, Cke. Grev. XII, p. 30. Rav. Fungi Amer. 587.

Hyphæ fasciculate, short, olive-brown, hypophyllous, on round, reddish brown, (3—4 mm.) spots, surrounded by a pale, reddish discoloration. Conidia attenuated above, 3—4 septate, hyaline, 70 x 3 μ .

On leaves of *Morus rubra*, South Carolina (Ravenel), Kansas (Kellerman.)

37. *CERCOSPORA PURPUREA*, Cke. Grev. VII, p. 34. Rav. F. Am. 190. *C. Perseæ*, E. & M., Am. Nat., Feb. '84, p. 189.

Hyphæ epiphyllous; densely erumpent-cæspitose, dark brown, faintly septate, subdenticulate above, 50—70 x 4—6 μ , on round or irregular reddish brown definite spots ($\frac{1}{4}$ —1 cm.) Conidia obclavate-cylindrical, 40—100 x 6—8 μ , septate, nearly hyaline.

On leaves of *Persea palustris*, Ga. (Ravenel), Fla. (Martin.)

38. *CERCOSPORA HEUCHERÆ*, E. & M. Am. Nat., Feb. '84, p. 189.

Spots brown, mostly round (4—5 mm.), border obsolete. Hyphæ fasciculate, flexuous, light brown, mostly hypophyllous, 30—35 x 3—4 $\frac{1}{2}$ μ . Conidia subhyaline (light straw color), cylindric-obclavate, septate, 60—70 x 3 μ .

On leaves of *Heuchera Americana*, Penn. (Dr. Martin.)

39. *CERCOSPORA XANTHOXYLI*, Cke. Grev. XII, p. 30. Rav. Fungi Amer. 780.

Hyphæ epiphyllous, short, 10—12 x 4 μ , brown, on pale brown, definite spots, (5—10 mm.) Conidia obclavate-cylindrical, 1—3 septate, hyaline, 25—38 x 3—4 μ .

On leaves of *Xanthoxylon Carolinense*, Ga. (Ravenel.)

40. *CERCOSPORA DEMETRIONIANA*, Winter, Rab.-Winter Fungi Eur. 3079.

Spots large ($\frac{1}{4}$ cm.) round, sometimes confluent, dirty-brown above,

grayish below, generally concentrically zoned, not very definitely limited, Tufts of hyphæ minute, amphigenous, scattered. Hyphæ fasciculate, not at all or only slightly torulose sparingly and remotely septate, fuscous, generally 110—130 μ long, 5—6 μ thick but sometimes elongated to 1 mm. long. Conidia filiform, subclavate, *i. e.* gradually attenuated upwards from the slightly thickened base, hyaline, multiseptate, brownish, reaching even 170 μ long, 5—5½ μ thick.

On *Crotalaria sagittalis*, Missouri (Demetrius.)

41. CERCOSPORA DIODEÆ, Cke. Grev. VII, p. 34. Rav. F. Am. 293.

Hyphæ epiphyllous, fasciculate, septate, fuscous, on round, determinate, rusty brown spots, (2—3 mm.) Conidia cylindrical, slender, hyaline, 50 x 3 μ .

On leaves of *Diodia teres*, S. Carolina (Ravenel.)

42. CERCOSPORA ROSÆCOLA, Pass. in Thuem. M. U. no. 333. Sacc. Myc. Ven. 1249. N. A. F. 1255.

Spots round, gray-brown (1½—2 mm.) border dark brown. Hyphæ amphigenous (mostly epiphyllous), dark, subcontinuous, subnodulose above, 20—50 x 4—4½ μ , collected into small, dense, hemispherical tufts. Conidia cylindrical, slightly attenuated above, nearly straight, 3—5 septate, 30—60 x 3½—4 μ .

On leaves of roses.

43. CERCOSPORA MICROSORA, Sacc. Mich. II, p. 128. *Cercospora Tilia*, Pk. Bot. Gaz. VI, p. 277.

"Spots small, numerous, suborbicular, brown with a paler center. Hyphæ tufted, hypophyllous, minute. Conidia bacillary, brownish or cinereous, 3—5 septate, 25—40 x 3½—4 μ . The center of the spots on the upper surfaces is sometimes tinged with reddish brown, on the lower surface with cinereous."

On living leaves of *Tilia Americana*, June, Vermont (Pringle.)

We have seen no specimens of Prof. Peck's species, but the characters quoted above agree so well with the description of *C. microsora*, Sacc., and with the specimens in Fungi Gallici 2062, and Rab.-Winter F. E. 2781, that there can be little doubt of its being this species.

44. CERCOSPORA MAGNOLIÆ, Ell. & Hark. Bull. Tor. Bot. Club, VIII, p. 27. N. A. F. 643.

Spots suborbicular, minute, less in size than the head of a pin, visible on both sides of the leaf and surrounded by a dark, raised border. Hyphæ fasciculate, erect, septate, nearly black, 25—40 μ high. Conidia obclavate, 3—5 septate, 20—40 μ long. Only 3 or 4 tufts of hyphæ grow on each spot.

On living leaves of *Magnolia glauca*, Newfield, N. J.

45. CERCOSPORA EUPATORII, Pk. 33d Rep. N. Y. State Mus. p. 29.

"Spots at first small and pale green, then larger, suborbicular, determinate, reddish-gray or reddish-brown, with an elevated margin and

darker border. Hyphæ tufted, short, simple, colored. Conidia elongated, slender, slightly thickened towards one end (below ?) obtuse, colorless, 3-septate, 50—75 μ long."

On living leaves of *Eupatorium album*, Long Island, N. Y. (Miller.)

46. CERCOSPORA FILISPORA, Pk. (in herb.)

Spots orbicular or irregular, brown (3—5 mm.) with a narrow, red-brown border, amphigenous. Hyphæ nearly obsolete, consisting, merely of closely compacted, elongated cells arising from the surface of little sclerotoid tubercles thickly scattered over the surface of the spots and bearing fascicles of long (125—200 \times 2—2½ μ), multiseptate, yellowish, subhyaline, more or less curved conidia, which are so abundant as to give a cinereous or lead colored hue to the surface of the spots. The conidia are only slightly attenuated above.

On *Lupinus perennis*, July, N. Y. (Peck.)

47. CERCOSPORA INQUINANS, Cke. Grev. VII, p. 12.

"Amphigenous. Hyphæ fasciculate, short, dark. Conidia obclavate, robust, 1—3 septate, brown (fuligineis), 30—70 \times 6 μ .

On living leaves of *Gymnocarpus*." California (Harkness.)

48. CERCOSPORA SYMPLOCARPI, Pk. De Thuem. M. U. no. 669. N. A. F. 1259.

Spots definite, suborbicular, brown, with a darker border (¼—½ cm.) Hyphæ amphigenous, short, thick, light brown, cæspitose. Conidia long, (75—125 μ) obclavate-cylindric, multiseptate, subhyaline.

On living leaves of *Symplocarpus fatidus*, July, N. Y. (Peck), Pa. (Rau.)

49. CERCOSPORA CERCIDICOLA, Ell. Am. Nat. Oct. '82, p. 810. N. A. F. 1246.

Spots when first appearing small (1 mm.) and nearly black, but soon enlarging (3—4 mm.), and becoming light gray or dull white above but remaining a rusty brown beneath, limited by a narrow, black-brown raised border which is surrounded by a zone of rusty, shaded brown. Hyphæ amphigenous, fasciculate, brown, 90—114 \times 3½—4 μ , subgeniculate or subundulate above. Conidia oblong-clavate, faintly 3-septate, 30—40 \times 5—7 μ .

On living leaves of *Cercis Canadensis*, Ky. to Kansas (Kellerman.)

50. CERCOSPORA APII, Fres. Beitrag. p. 91, figs. 46-54.

Spots amphigenous (4—6 mm.) pale brown, suborbicular with a definite, narrow, raised margin. Hyphæ mostly hypophyllous, in minute (25—30 μ) brown tufts, thickly scattered over the spots, pale brown, continuous or with 1—2 faint septa, subundulate above, 40—60 \times 4—5 μ . Conidia slender, obclavate, faintly (3—10 septate), 50—80 \times 4 μ . The affected leaves are at first roughened here and there with groups of minute pustules visible on both sides of the leaf. These groups soon become brownish in the center, and the brown color soon develops into the spots above described.

The above notes, which agree well with the original description and figures of Fresenius, are from specimens collected in Michigan, on cultivated celery, by Professor Beal, and communicated to us by Dr. Farlow. Specimens on celery collected in Italy by Prof. Passerini (comm. de Thuemen) appear to be the same as the Michigan specimens, except that the spots are less definite. Specimens in de Theumen's M. U., No. 483 (on *Petroselinum*), and in Rabh. Myc. Eur. 2071, on the same host, differ from the above in their much smaller, paler spots, larger and less numerous tufts of hyphæ which are darker and more distorted above, bearing oblong 1—3 septate, conidia, 30—50 x 5—7 μ , without any slender prolongation above. Specimens on *Pastinaca* collected in New York by Prof. Halsted (comm. Dr. Farlow) have hyphæ and conidia scarcely distinguishable from the last mentioned species in their microscopical characters, but there are no spots, the minute, blackish tufts of hyphæ being evenly and thickly distributed over the lower surface of the leaves or occupying small, irregular areas bounded by the veinlets. In the specimens on *Pastinaca* in de Theumen's M. U. 1169, we find no *Cercospora*. In specimens on *Pastinaca* from Iowa, the hyphæ are confined to small and scattered areas bounded by the veinlets of the leaf, but on these areas the tufts of hyphæ are densely crowded so as to appear effused, and are of a light cinereous hue, perhaps on account of the abundant conidia which are, the same as in the other specimens on *Pastinaca*, 1—3 septate. Specimens on *Pastinaca* sent from Wisconsin by Professor Trelease are the same as the Iowa specimens on *Pastinaca*, only the conidia are longer and more distinctly attenuated above, though only 3-septate. On the Wisconsin specimens was also a *Ramularia* with oblong-cylindrical, 10—20 x 3 μ , 1-septate conidia, growing on small (2—3 mm.), definite, rusty brown spots and having the general appearance of the true *C. Apii* Fres.

We have left for the present all the forms above noted under *C. Apii*, Fres. though strongly of the opinion that the variety on *Pastinaca* at least will yet prove specifically distinct.

c. *Spots angular or irregular.*

51. CERCOSPORA BØHMERIÆ, Pk. 34th Rep. N. Y. State Mus., p. 48.

Spots small, numerous, often confluent, angular, limited by the veinlets, brownish, sometimes becoming arid and grayish. Hyphæ hypophyllous, tufted, short, subflexuous, colored. Conidia subcylindrical or bacillary, generally curved, 4—5-septate, colored, 40—80 μ long. The spots, though numerous are not very conspicuous, on account of their very dull color; the tufts of hyphæ also are very numerous, but so minute as scarcely to be visible to the naked eye. They are compactly united at base in a sort of sclerotoid mass as in *C. venturioides*.

On leaves of *Bæhmeria cylindrica*, N. Y. (Peck.)

52. CERCOSPORA LIRIODENDRI, Ell. & Hark. Bull. Torr. Bot. Club, VIII, p. 27. N. A. F. 645.

Hypophyllous. On small (2 mm.) angular, brownish spots, mostly bounded by the veinlets of the leaf. Hyphæ fasciculate, erect, sparingly

septate, brown. Conidia oblong, uniseptate, hyaline, 20—50 μ long.

On leaves of *Liriodendron Tulipifera*, Vineland, N. J. October.

53. *CERCOSPORA LEPTOSPERMA*, Pk. 30th Rep. N. Y. St. Mus., p. 55.

Hyphæ tufted, short, hyaline, seated on pale greenish, angular, indefinite spots. Conidia colorless, very slender, subfiliform, 75 μ long, slightly thicker toward the base where there are usually 1 or 2 obscure septa.

On living leaves of *Aralia nudicaulis*, Iowa (Holway.)

54. *CERCOSPORA TUBEROSA*, E. & K. Bull. Torr. Bot. Club, XI, p. 116.

Hypophyllous, on spots (.75—.5 cm.) at first gray and imperfectly defined, but at length dirty brown and of irregular outline, angular, elongated and partly limited by the veinlets of the leaf, hyphæ arising from a small tubercular base, nearly straight and more or less toothed above, septate, brown, 35—45 x 4 μ . Conidia subcylindric, slightly tapering upwards, subfuscous, 5—10-septate, 80—110 x 3.5—4 μ .

The spots are darker and more distinctly defined on the upper side of the leaf. This differs from No. 15 chiefly in the character of the spots.

On leaves of *Apios tuberosa*, Kansas (Kellerman.)

Cercospora glaucescens, Winter, which is the same as this, was published in Rab.-Winter Fungi, about the same time that *C. tuberosa* appeared in the bulletin, so that it is difficult to say which has precedence. Dr. Winter's specimens were from Missouri.

40. *CERCOSPORA ELONGATA*, Pk. 33d Rep. N. Y. State Mus., p. 29.

Spots irregular, angular, limited by the veinlets of the leaf, often confluent, sometimes arid, brown, grayish brown or cinereous. Hyphæ amphigenous, tufted, colored, subflexuous, sometimes nodulose. Conidia elongated, obscurely 3—many-septate, attenuated, colorless, 50-150 x 4-5 μ .

On living leaves of *Dipsacus sylvestris*, Aug., N. Y. (Peck.)

56. *CERCOSPORA ALTHÆINA*, Sacc. Mich. 1, p. 269.

Spots thickly scattered over the leaf (2—4 mm.), subangular, partly limited by the veinlets of the leaf, olivaceous, becoming grayish-brown, with a narrow, darker, slightly raised border. Hyphæ cæspitose, amphigenous, fuscous, nearly straight, scarcely septate, 49—60 x 5 μ . Conidia fusoid-cylindrical, 3—5 septate, only moderately attenuated above, hyaline. The above notes are from specimens found by Dr. Farlow on *Althæa rosea*, at Wood's Holl, Mass., and they agree so well with Saccardo's description of *C. althæina* that we think it is that species, though we have no authentic specimen for comparison.

C. malvicola, E. & M., Am. Nat., Oct. '82, p. 810, N. A. F. 821, is probably only a form of this, differing principally in its longer (80—112 μ) hyphæ and conidia (75—90 μ .)

Specimens on *Callirrhoe* (?) collected by Dr. Kellerman at Great Bend, Ks., Aug. 1884, are essentially the same as N. A. F. 821, and specimens on *Abutilon Avicennæ* from Manhattan, Ks., Sept. '84, though differing somewhat in general aspect, do not show any marked difference in their

microscopical characters. In all the specimens except those on Abutilon, the spots at first present a peculiar dull, greenish, water-soaked appearance which, though difficult to describe, is easily recognized when once seen.

We have thought it best, for the present at least, to refer all these forms to *C. althæina*, Sacc., though it is not absolutely certain that they belong to that species.

57. *CERCOSPORA ÆRUGINOSA*, Cke. Rav. Fungi Amer. 68.

Spots irregular, suborbicular (2—3 mm.), rather inconspicuous and indefinitely limited, brownish. Hyphæ densely fasciculate, greenish, short (35 μ). Conidia cylindrical, attenuate above, 3—5-septate, 60 x 3½ μ .

On leaves of *Rhamnus*, South Carolina.

58. *CERCOSPORA GALII*, Ell. & Hol. Jour. of Mycol., I, p. 5.

Mostly hypophyllous, on dead grayish-brown, definitely limited spots and areas of the leaves. Hyphæ simple, continuous, brown, undulate and geniculate above, 35—50 x 3—4 μ , forming dense tufts arising from a tubercular base. Conidia cylindrical, continuous (becoming septate), brownish, nucleolate, 30—40 x 3½ μ , nearly straight.

On leaves of *Galium Aparine*, July, Iowa (Holway.)

59. *CERCOSPORA VICIÆ*, Ell. & Hol. Jour. of Mycol. I, p. 5.

On light brown, purplish bordered spots and irregularly shaped, dead area of the leaf. Hyphæ densely tufted, continuous, brown, entirely or slightly denticulate above, short (25—30 x 3—4 μ). Conidia cylindrical, granular, becoming 3-septate, 30—40 x 3—3½ μ . Differs from *C. Lupini*, Cke., and *C. Phaseolorum* Cke., in its definitely limited spots. The former also has the hyphæ branched much as in *C. racemosa*, E. & M.

On leaves of *Vicia sativa*, Iowa (Holway.)

60. *CERCOSPORA ZEBRINA*, Pass. in Rab. F. E. 2277.

Spots elongated in the direction of the nerves of the leaf, narrow, nearly black, limited by the veinlets of the leaf. Hyphæ simple, entire, subflexuous above, smoky-brown. Conidia very long, attenuated above, multiseptate, hyaline.

On leaves of *Trifolium agrarium*, N. Y. (Peck.)

61. *CERCOSPORA GARRYÆ*, Hark. Bull. Cal. Acad. Sci., February 1884, p. 38.

"Hypophyllous; spots irregular, pale. Hyphæ pale brown, slender, Conidia nearly linear, slightly attenuated above, hyaline, 7—12-septate, 110 x 10 μ ."

On living leaves of *Garrrya elliptica*, Cal. (Harkness.)

62. *CERCOSPORA CAULOPHYLLI*, Pk. 33d Rep. N. Y. State Mus., p. 30.

Spots irregular or suborbicular, dark brown or grayish, with a dark brown margin. Hyphæ hypophyllous, tufted, flexuous, nodulose above, colored, rarely branched. Conidia oblong or cylindrical, with 1—3 septa, colorless, 20—30 x 7—8 μ .

On living or languishing leaves of *Caulophyllum thalictroides*, July, N. Y. (Peck.)

63. *CERCOSPORA SQUALIDULA*, Pk. 33d Rep. N. Y. State Mus., p. 29.

Spots angular or suborbicular, brown or grayish brown with a dark border. Hyphæ amphigenous, tufted, slightly nodulose above, colored. Conidia cylindrical or subclavate, very unequal in length, 30—110 μ long, nearly hyaline, continuous or with 1—3 faint septa. The spots are sometime of a uniform, dark brown color, and sometime grayish with a darker border.

On living leaves of *Clematis Virginiana*, Aug., N. Y. (Peck), Iowa (Holway.)

This is very closely allied to *C. olivascens*, Sacc., but a careful comparison of authentic specimens from Prof. Peck with the specimens in Mycotheca Veneta 1251, shows that the tufts of hyphæ in Saccardo's specimens are of a somewhat lighter color and less compact, the hyphæ longer, rather lighter colored and more distinctly toothed and geniculate above; conidia also longer and narrower and spots more angular, limited mostly by the veinlets of the leaf. In Peck's specimens, too, the hyphæ are amphigenous. It is not improbable that this and the next No. will prove to be the same.

64. *CERCOSPORA RUBIGO*, Cke. & Hark. Grev. XIII, p. 17.

"Amphigenous. Spots ferruginous, elliptical and irregular. Hyphæ very short, scattered. Conidia cylindrical, straight or curved, ends obtuse, 3—4-septate, hyaline, 35—40 x 4 μ ."

On leaves of *Clematis*, Cal. (Harkness.)

65. *CERCOSPORA ECHINOCYSTIS*, E. & M. Am. Nat., Dec. '82, p. 1003.

Spots small (1—3 mm.), angular, bounded partly by the veinlets of the leaf. Hyphæ brown, fasciculate, hypophyllous, scarcely septate, 35—45 x 4 μ . Conidia clavate-cylindrical, hyaline, 3—6 septate, 80—105 x 3 μ . The spots are very abundant and leaves on which they abound soon wither. Hyphæ also occur on the upper surfaces of the leaves.

On living leaves of *Echinocystis lobata*, Ky. and Ohio (Kellerman.)

d. Spots indefinite.

66. *CERCOSPORA GRANULIFORMIS*, Ell. & Hol. Jour. of Mycol. I, p. 6.

Amphigenous, on large (1 cm.) round, indefinitely limited brown spots. Hyphæ short (15—25 x 3 μ) continuous, brown, nearly straight, obtuse and entire at first, becoming subundulate and somewhat toothed above, densely compacted into small (75 μ), sphaeriæform tufts, scattered quite thickly over the spots and resembling minute perithecia, brownish at first but at length black. Conidia cylindrical, straight, brownish, 1—3 septate, 17—85 x 2½—3 μ . Allied to *C. sphaeriæformis*, Cke., but quite different from *C. Violæ*, Sacc.

On leaves of *Viola cucullata*, July, Iowa (Holway.)